

### **REMARKS**

Claims in the case are 10-14. No claims have been amended, added or cancelled herein. Claims 1-9 and 15 were cancelled in previous amendments.

Claims 10-14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over F.C. Nava Alonso et al, *Tungsten Trioxide Reduction-Carburization with Carbon monoxide – Carbon Dioxide Mixtures: Kinetics and Thermodynamics*, INTERNATIONAL JOURNAL OF MINERAL PROCESSING, 20 (1987), pp 137-151 (**Alonso et al**) in view of Demande de Brevet D'Invention N° de publication 2 294 133 (**Felten et al**).

This rejection is respectfully traversed in light of the following remarks.

On page 3 of the Office Action of 18 March 2005, it is stated that the present rejection may be overcome by a showing that superior results are obtained only within Applicants' claimed range, and that such superior results are not obtained outside of the claimed range. Included in the Appendix of the present Response is a Declaration providing comparative data which shows that superior results are obtained only within Applicants' claimed range, and that such superior results are not obtained outside of the claimed range. \*

Comparative Examples 1, 2 and 3 of the Declaration included herewith were conducted under the same conditions as described in Example 1 of the specification (page 8). Example 1 of the specification was performed with a carbon activity of 0.65 (within Applicants' claimed range of "from 0.4 to less than 1"), while Comparative Examples 1-3 of the Declaration were performed with carbon activities of 0.35, 1.11 and 1.03, which are outside of Applicants' claimed range. The material produced according to Example 1 was found, by x-ray diffraction analysis, to be pure-phase tungsten carbide. The materials produced according to Comparative Examples 1, 2 and 3 each undesirably contained unconverted tungsten (i.e., they were not in the form of pure-phase tungsten carbide).

In light of the Declaration included herewith and the preceding remarks, Applicants are deemed to have met their burden of coming forward with evidence showing that superior results are obtained only within their claimed range, and that superior results are not obtained outside their claimed range, thus rebutting the rejection of their claims as being obvious in light of Alonso et al in view of Felten et al.

Alonso et al disclose a method of preparing tungsten carbide by heating tungsten trioxide in the presence of (i) mixtures of CO and CO<sub>2</sub>, and (ii) CO alone, at temperatures from 700°C to 1000°C (abstract). Alonso et al teach that “[t]he rate and extent of reaction of tungsten trioxide reduction-carburization decreases as the carbon dioxide content in the CO-CO<sub>2</sub> mixture increases” (page 150, item-3). In addition, Alonso et al teach that the most appropriate conditions for the reduction-carburization of tungsten trioxide involves the use of a gas consisting of 100% CO (page 150, item-1). As such, when taken as a whole, a skilled artisan would reasonably interpret Alonso et al as teaching away from the use of mixtures of CO and CO<sub>2</sub> in favor of CO alone for the carburization of tungsten trioxide.

Applicants further submit that when CO is used alone for the carburization of tungsten trioxide, the undesirable deposition of elementary carbon is thermodynamically possible in later stages of the reaction, due to the reaction of CO with W or WO<sub>2</sub>. Alonso et al appear to disregard the resultant deposition of elementary carbon in their process. Carbon deposition in later stages of the carburization reaction competes with and reduces the desired formation of WC.

Applicants have found that minimizing the deposition of carbon in the course of the carburization of tungsten trioxide requires that the carbon activity be less than 1, but at the same time not so low as to render the rate of WC formation negligible. Alonso et al do not disclose, teach or suggest the selection of a carbon activity that will result in a combination of minimum carbon deposition coupled with a desirable rate of WC formation.

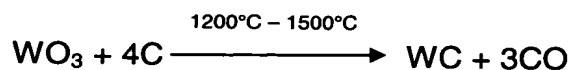
Contrary to the assertions made on page 2 of the Office Action of 18 March 2005, Applicants respectfully submit that Alonso et al does not disclose or suggest Applicants’ claimed range of carbon activity values of 0.4 to less than 1. It is argued on page 3 of the Office Action that Alonso et al discloses a broad range of carbon

activity values ranging from 0.026 (61 wt% CO) to essentially infinity (100 wt% CO), based on the disclosure at page 145 of Alonso et al. Applicants disagree and respectfully submit that this argument represents a mischaracterization of Alonso et al. Alonso et al.'s disclosure of carbon activity values of essentially infinity is for a gas that consists of 100 wt% CO (i.e., a gas that is free of CO<sub>2</sub>). Applicants' claimed method involves the use of a mixture of CO and CO<sub>2</sub>. As such, Alonso et al.'s disclosure relating to a gas consisting of 100% CO, and any carbon activity values associated therewith or derived therefrom does not reasonably extend to or touch upon applicants' claimed process and carbon activity range of 0.4 to less than 1.

Alonso et al.'s highest disclosed carbon activity value for a mixture of CO and CO<sub>2</sub> is 0.077 (78 Wt% CO), which is 5.2 times smaller than the lower limit of Applicants' claimed carbon activity range of 0.4 to less than 1. As such, Alonso et al.'s disclosure is not deemed to reasonably extend to, touch upon or suggest Applicants' claimed method, which recites a carbon activity value range of 0.4 to less than 1.

Felton et al disclose a method of preparing tungsten carbide that involves treating finely divided tungsten trioxide with carbon monoxide (CO) at a temperature at which no agglomeration or sintering occurs (e.g., at temperatures of 600°C, 700°C and 800°C). See the abstract, and the examples at page 5-6 of Felton et al.

At page 1, line 23, Felton et al disclose the following formula.



This disclosure by Felton et al is limited to the formation of tungsten carbide from tungsten trioxide, and does not reasonable extend to or touch upon a post heat treatment of tungsten carbide after it is formed.

On page 5 of the Office Action of 18 March 2005, it is argued that motivation for applying Felton et al to Alonso et al is based on the possibility that "some of the precursor tungsten oxide *might* still remain in unreacted form" (emphasis added). Since Alonso et al provides no disclosure or suggestion as to the presence of unreacted precursor tungsten oxide, it is respectfully submitted that the argument provided on page 5 of the Office Action evidences an assumption on the part of the proponent thereof.

The remarks on page 3 of the Office Action regarding the disclosure by Felton et al representing a post heat treatment of tungsten carbide after it is formed, and those further remarks provided on page 5 of the Office Action, are deemed to represent an assumption on the part of the Examiner that is neither supported nor suggested by the disclosures of Felton et al or Alonso et al. “[E]xaminer's assumptions do not constitute the disclosure of prior art.” See *In re Rijckaert*, 9 F.3d 1531, 1533, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993) wherein the Court of Appeals, Federal Circuit stated:

“[i]n rejecting claims under 35 U.S.C. section 103, the examiner bears the initial burden of presenting a prima facie case of obviousness ... A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art ... If the examiner fails to establish a prima facie case, the rejection is improper and will be overturned. *Id.* at 1532 (citations omitted). *Rijckaert* argues that the examiner has not established a prima facie case of obviousness and that the *examiner's assumptions do not constitute the disclosure of prior art. Id.* at 1533 (emphasis added). We agree. *Id.*

Even if Alonso et al and Felton et al were combined, Applicants' claimed method would not result from such combination. Alonso et al teach away from tungsten trioxide carburization methods that make use of mixtures of CO<sub>2</sub> and CO in favor of those that make use of CO alone. Alonso et al do not disclose, teach or suggest a range of carbon activity values that overlap or even come close to Applicants' claimed range of 0.4 to less than 1. Alonso et al provide no disclosure or suggestion with regard to post treating tungsten carbide at an elevated temperature of 1150°C to 1800°C after the tungsten carbide is formed. Felton et al disclose the formation of tungsten carbide from tungsten trioxide by heating in the presence of CO alone. Felton et al provide no disclosure, teaching or suggestion with regard to performing their disclosed reaction with a mixture of CO and CO<sub>2</sub>. Felton et al provide no disclosure, teaching or suggestion with regard to: carbon activity values of 0.4 to less than 1; or post treating tungsten carbide at an elevated temperature of 1150°C to 1800°C after the tungsten carbide is formed.

Alonso et al and Felten et al, either alone or in combination, do not disclose, teach or suggest a carburization method that includes: the use of a mixture of CO and CO<sub>2</sub>; the CO<sub>2</sub> being present in an amount above the Boudouard equilibrium content corresponding to the carburization temperature; a temperature of 850°C to 950°C; a carbon activity of from 0.4 to less than 1; and a post treatment step that involves heating the formed tungsten carbide to a temperature of 1150°C to 1800°C. In addition, Alonso et al and Felten et al, either alone or in combination, do not disclose, teach or suggest the superior results obtained with the carburization method of Applicants' present claims, as discussed previously herein with regard to the comparative results provided in the declaration included herewith.

In light of the preceding remarks, Applicants respectfully submit that a *prima facie* case of obviousness has not been made relative to Alonso et al and Felten et al, either alone or in combination. "[T]he examiner bears the initial burden of presenting a *prima facie* case of obviousness. Only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicants." *In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993). It is submitted, *in arguendo*, that even if a *prima facie* case of obviousness has been made relative to the cited references, Applicants have met their burden of coming forward with evidence that clearly rebuts any inference of obviousness relative to, and supports the non-obviousness of, their claimed process (in particular with regard to their claimed carbon activity range of from 0.4 to less than 1).

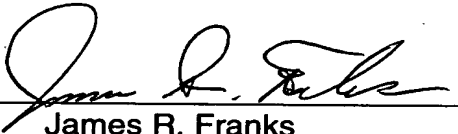
The rejection appears to impermissibly use Applicants' application as a blueprint for selecting and combining or modifying the cited references to arrive at Applicants' claimed invention, thereby making use of prohibited hindsight in the selection and application of the cited references. The use of hindsight reconstruction of an invention is an inappropriate process by which to determine patentability. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1457 (Fed. Cir. 1998). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 1075 (Fed. Cir. 1988). Modifying "prior art references without evidence of such a suggestion, teaching or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability -- the essence of hindsight."

*In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999). "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992).

In light of the preceding remarks, Applicants' claims are deemed to be unobvious and patentable over Alonso et al in view of Felten et al. Reconsideration and withdrawal of the present rejection is respectfully requested.

In light of the amendments herein and the preceding remarks, Applicants' presently pending claims are deemed to define an invention that is unanticipated, unobvious and hence, patentable. Reconsideration of the rejections and allowance of all of the presently pending claims is respectfully requested.

Respectfully submitted,

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**APPENDIX**

**Declaration of Dr. Benno Gries, Containing Comparative Examples 1-3.**